



**National
Transportation
Safety Board**

The Increasing Prevalence of Performance-Based Activities to Improve Safety

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Performance-Based Safety Regulations

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Topics

- NTSB Basics
- Distinction between Performance-Based and Prescriptive Activities
- Examples of Increasing Role of Performance-Based Activities for Improving Safety

NTSB 101

- Independent federal agency, investigate transportation mishaps, all modes
- Determine probable cause(s) and make recommendations to prevent recurrences
- Also issue safety studies/special investigation reports
- Primary product: Safety recommendations
 - More than 80% favorably received, even though implementation is not mandatory
- ***SINGLE FOCUS IS SAFETY***

Performance-Prescriptive Continuum

- Performance based regulations tell what to do
- Prescriptive regulations tell how to do it
- Typically a continuum, may be no bright line between performance and prescriptive

Benefits of Performance-Based

- Encourages innovation and adoption of new technologies
- Tends to create goal-oriented risk management system
- Enables more efficient utilization of resources

Source: The Pros and Cons of Performance-Based Regulatory Systems, Dr. M. Sam Mannan, Texas A&M University, 2012

Limitations of Performance-Based

- More likely to involve Imprecise terms such as “effective” or “adequate”
- Hence, more difficult to define or measure compliance
- May be more challenging for smaller companies that have less internal capacity and/or flexibility to develop plans
- Outcome less predictable

Source: The Pros and Cons of Performance-Based Regulatory Systems, Dr. M. Sam Mannan, Texas A&M University, 2012

When Prescriptive May Be Better

- Standard procedures that have little need for innovation
- High-risk environment, existing technologies suitable for foreseeable future
- Relatively unchanging situations where extensive experience exists
- As complement to performance standards

Source: The Pros and Cons of Performance-Based Regulatory Systems, Dr. M. Sam Mannan, Texas A&M University, 2012

Ultimate Objective: Safety

- Objective is not compliance, but continuously improving safety, which is a performance-based objective
- Regulations are the “floor”
- Ideally, safety objective is well above the “regulatory floor;” hence irrelevant whether regulations are performance or prescriptive
- Example: US Commercial aviation

Commercial Aviation Success

- Heavily regulated and enforced
- Accident rate “plateaued,” early 1990’s
- Began voluntary collaboration, Commercial Aviation Safety Team (CAST)
- Reduced fatality rate more than 80% from plateau in first ten years

Benefits of Collaboration

- Improvements implemented willingly and more quickly
- Safety improvements more effective and efficient
- Improves productivity while improving safety
- Enables tweaking
- Minimizes unintended consequences
- Has not generated any new regulations

Moral of the Story

Everyone who is involved in the problem should be involved in developing the solution

Trend: Toward Performance

- Industries that are becoming more complex, with rapid technological advances, are trending towards performance-based interventions
- Interventions developed by CAST are largely performance-based
- NTSB recommendations from accident investigations are largely performance-based

Example: San Bruno, CA, 2010

- Explosion of 400psi natural gas transmission pipeline in populated area
- Causes
 - Inadequate quality assurance/quality control program
 - Inadequate integrity management program
 - Regulatory exemption from pressure testing
 - Flawed emergency response procedures



Industry Collaboration After San Bruno

- American Gas Association (AGA) reviewed risk management programs in other high-reliability organizations
- AGA looked at peer review process initiated decades ago by the Institute of Nuclear Power Operations (INPO): Teams from different facilities reviewed each others' operations
- AGA instituted peer review for natural gas utility companies
- Peer review emphasizes performance rather than compliance
- Note similarities to CAST: Voluntary, collaborative, performance objective, well above “regulatory floor”

Example 2: Marshall, MI, 2010

- Crude oil spill (most costly onshore oil cleanup in US history)
- Causes:
 - Pervasive organizational failures by operator
 - Deficient Integrity Management procedures
 - Inadequate control of personnel
 - Poor public awareness program
 - Inadequate integrity management oversight by regulator
 - Inadequate emergency response resources and procedures



Marshall: NTSB Recommendation to American Petroleum Institute:

Facilitate the development of a safety management system standard specific to the pipeline industry that is similar in scope to your Recommended Practice 750, *Management of Process Hazards*. The development should follow established American National Standards Institute requirements for standard development. (P-12-17)

- Result: API Recommended Practice (RP) 1173; NTSB closed recommendation as “Exceeds Recommended Action”
- SMS helps enable, and depends heavily upon, performance-based activities
- Also similar to CAST: Voluntary, collaborative, performance objective, well above “regulatory floor”

Example 3: NTSB Safety Study on Integrity Management of Gas Transmission Pipelines in HCAs

Goal: To determine whether PHMSA's Gas Pipeline Integrity Management Rule (2004) has resulted in improved safety

NTSB's IM Recommendations: Performance or Prescriptive?

- Establish minimum criteria for eliminating threats
- Require all personnel involved in integrity management programs to meet minimum professional qualification criteria
- Require that all natural gas transmission pipelines be “piggable”
- Develop a plan to eliminate direct assessment as the sole integrity assessment method for gas transmission pipelines

Conclusions

- Ultimate objective is continuously improving safety
- To the extent improving safety is well above the “regulatory floor,” less relevant whether regulations are performance-based or prescriptive
- In industries with extensive innovation, safety is more likely to be improved by performance-based regulations and other activities

Thank You!!



Questions?



National Transportation Safety Board